

New Method for Ascertaining Maternal Deaths in Michigan 1999-2003



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Why Maternal Mortality matters?

Infant Mortality Rate (IMR)

Maternal Mortality Ratio (MMR)

} Basic Health Indicators
that reflect a nation's
health status

- ❑ **Infant Mortality Rate (IMR)**: number of infant deaths per 1,000 live births
- ❑ **Maternal Mortality Ratio (MMR)**: number of maternal deaths per 100,000 live births

Maternal Mortality Study Group

Established in 1987 by:

- CDC's Division of Reproductive Health
- American College of Obstetricians and Gynecologists (ACOG)
- State health departments

Case Definitions

Pregnancy-associated death = the death of a woman while pregnant or within 1 year of termination of pregnancy, irrespective of cause

● **Pregnancy-related death** = the death of a woman while pregnant or within 1 year of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by her pregnancy or its management, but not from accidental or incidental causes

● **Not-pregnancy-related death** = the death of a woman while pregnant or within 1 year of termination, due to a cause unrelated to pregnancy

Michigan Maternal Mortality Background

Michigan Maternal Mortality Study (MMMS) Initiated in 1950 as a collaborative effort among:

- Michigan Department of Community Health,
- Committee on Maternal and Perinatal Health of the Michigan State Medical Society and
- Chairs of the Departments of Obstetrics and Gynecology of the Medical Schools in Michigan

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Currently: Michigan Maternal Mortality Surveillance (MMMS) is:

- Michigan Department of Community Health (MDCH)'s program
- Bureau of Epidemiology and Bureau of Family, Maternal and Child Health share the responsibilities
- Committee on Maternal and Perinatal Health of the Michigan State Medical Society - committed and strong partner

Maternal Mortality in Michigan 1987-1996 data

- Maternal Mortality Ratio (MMR) = 7.5
(pregnancy-related)
- Black / White ratio = 6.3*

*"Maternal Mortality among Black and White women by State: United States, 1987-1996"; MMWR, 1999, 48(23);492

Objectives

1. To update the existing 1990-1998 Michigan maternal mortality report
2. To understand the leading causes of maternal deaths: pregnancy and non-pregnancy related

Data sources

- Cases identified and reported to MDCH by:
 - Hospitals
 - Medical examiners
 - Office of Vital Statistics

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 - Office of Vital Statistics
- New electronic maternal mortality linked file of 1999-2002 deaths was created in 2003: recently updated with 2003 data

Maternal mortality linked file

- Death certificates of women of reproductive age (10 to 45 years) were linked to live births certificates
- Added records:
 - Maternal deaths for which pregnancies ended in a fetal death were identified from the hospital reporting to MDCH
 - Pregnancy-related deaths not identified by previously mentioned sources, such as deaths due to ectopic or molar pregnancies, were identified by using ICD10 "O" codes from death certificates

Results

Maternal Mortality Cases

	1999	2000	2001	2002	2003
Maternal deaths with live births	61	49	61	60	59
By time from delivery:					
- within 42 days	17 (27.9%)	13 (26.5%)	16 (26.2%)	13 (21.7%)	21 (35.6%)
- 43-365 days	44 (72.1%)	36 (73.5%)	45 (73.8%)	47 (78.3%)	38 (64.4%)
Other cases with fetal deaths or identified by ICD 10 "O" codes	13	12	9	6	10
Total number of cases	74	61	70	66	69
MMR	55.4	45.7	51.4	49.5	52.8

Maternal Mortality by Race

	1999	2000	2001	2002	2003
White					
Number of cases	50	34	41	35	37
MMR	47.7	32.3	38.9	34.0	36.3
Black					
Number of Cases	21	25	28	28	23
MMR	88.1	103.9	119.2	125.9	102.8
Black/White Ratio	1.8	3.2	3.1	3.7	2.8

Maternal deaths to other races: 3 in 1999, 2 in 2000, 3 in 2002; 4 in 2003;

Maternal death with unknown race: 1 in 2001 and 5 in 2003

Maternal Mortality by Age

	Number	MMR
Age		
<20 years	25	37.0
20-29 years	151	43.4
30-39 years	138	59.1
40+ years	21	150.6

5 cases with unk age

Maternal Mortality by ICD10 Codes

- 58 cases with "O" ICD10 code (pregnancy-related codes):
 - 32 White / MMR = 6.2
 - 24 Black / MMR = 20.7 } Black/White Ratio = 3.3
- 282 cases with other ICD10 codes (pre-existing medical conditions, accidents, intentional self harm, assaults):
 - 165 White / MMR = 31.8
 - 101 Black / MMR = 87 } Black/White Ratio = 2.7

Most Prevalent Causes of Maternal Deaths: 1999-2003

1. Motor vehicle accidents: 15.9%
2. Cardiac diseases: 10.6%
3. Assaults: 10.3%
4. Malignant neoplasm: 9.4%
5. Obstetric acute complications (e.g. shock, amniotic embolism): 4.7%
6. Intentional self-harm: 4.4%
7. Mental and behavioral disorders (drug overdose): 3.2%
8. Hypertension during pregnancy (all stages): 3.2%
9. Accidental poisoning: 3.2%
10. Intracerebral hemorrhage: 2.6%
11. Cardiomyopathy in puerperium: 2.3%
12. Asthma: 2.3%

72.3% of all cases

Most prevalent causes by interval from delivery 1999-2003 data

0-42 days:

1. Intracerebral hemorrhage:16.3%
2. Cardiac diseases:11.3%
3. Hypertension during pregnancy:10%

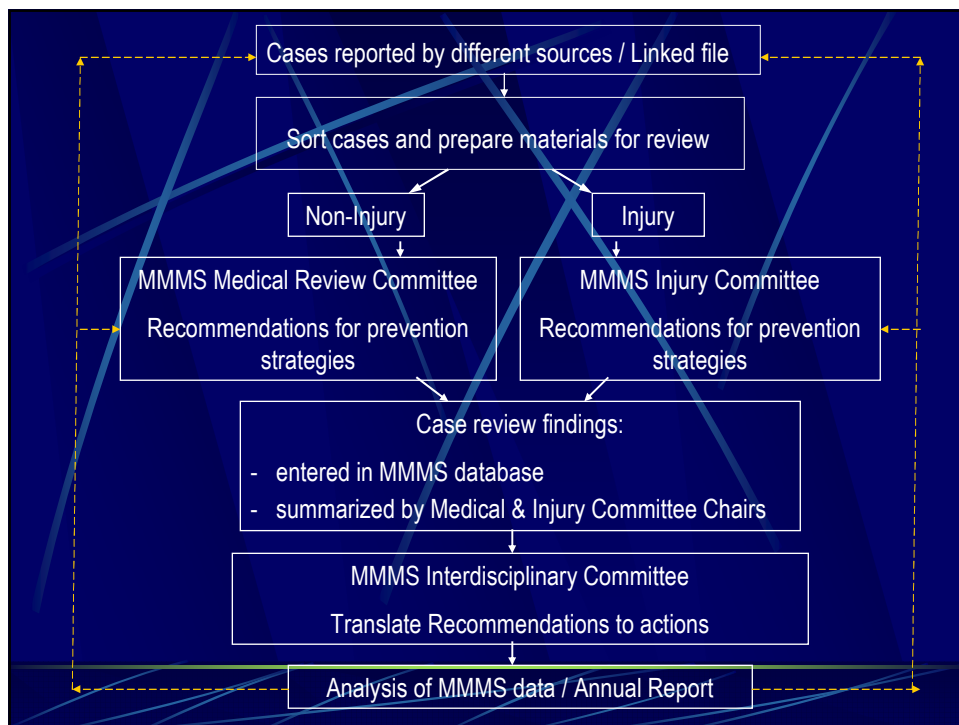
43-365 days:

1. Motor vehicle accident:22.4%
2. Malignant neoplasm:13.3%
3. Assaults:12.4%

Pregnancy outcomes associated with maternal deaths by race 1999-2003 data

	Very preterm (<32 wks)	Moderate Preterm (32-36 wks)	Total preterm (<37 wks)	Term (37+ wks)	Other / unknown
White	7 (3.5%)	26 (13.2%)	33 (16.8%)	113 (57.4%)	51 (25.9%)
Black	7 (5.6%)	15 (12%)	22 (17.6%)	63 (50.4%)	40 (32%)
Others	1	0	1	11	6
Total	15 (4.4)	41 (12.1%)	56 (16.5%)	187 (55%)	97 (28.5%)

Impact on MMMS Reviewed process



MMMS Strategies / Activities

- Findings disseminated through publications, grand rounds, presentations
- New MMMS database is being tested
- Recommendations to be translated into actions
- Maternal morbidity is being further analyzed by using the Hospital Discharge data linked with live births
- Serious life-threatening complications of pregnancy are being further explored for potential monitoring systems

Conclusions

- Newly created maternal mortality file identified violent deaths as the leading cause
- Expanded and complex review of all maternal deaths
- MMMS database developed: source for further analysis of maternal deaths

Strengths / Limitations

- Linkage process: an effective method to identify and track cases in a state such as Michigan where maternal mortality reporting is not mandatory
- Missing information
- Misclassification of deaths causes
- Underestimated maternal deaths due to misclassification: lack of relation between a woman's pregnancy and her death

Public Health Implications

- An expanded maternal mortality surveillance is needed to:
 - assess the problems and better understand the maternal deaths causes
 - develop targeted prevention strategies that may have greater population impacts
- Ongoing assessment and evaluation of the surveillance process: key for improvement

Acknowledgments

- Members of both, Medical and Injury Committee
- MDCH staff

Thank You !!!

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